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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

KELLEY, STEVEN SHAUN

ART UNIT

PAPER NUMBER

2617

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,792	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN KELLEY	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01-04-11.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-10 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-10 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 6-8, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 7,461,164 to Edwards et al. (hereinafter "Edwards") in view of the IEEE article from September 2000 entitled "IP QoS Delivery in a Broadband Wireless Local Loop: MAC Protocol Definition and Performance Evaluation" by Baiocchi et al. (hereinafter "the MAC Protocol article").

Regarding claim 1, Edwards teaches an OFDMA-TDMA (Orthogonal Frequency Division Multiplex--Time Division Multiple Access) based wireless Internet terminal comprising: a QoS profile storing information about a QoS policy (see QoS module 58 as shown in Fig. 7 and described in columns 10-11, which "stores QoS policies", as recited); a first module (see software-based MAC component 24A), comprising: classifier for identifying a type of packet traffic and classifying data packets corresponding to the packet traffic according to the QoS policy stored in the QoS profile (see QoS module 58, which "classifies", as recited); a first priority controller that gives first priorities to the classified data packets according to the QoS policy (see software-based MAC component 24A and see column 9, lines 32-35, which teach that the

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“software-based MAC component 24A also has a number of virtual queues to assist QoS functions”); and a second module (see hardware-based MAC component 24B), comprising a second priority controller for determining priorities of the PDUs according to packet information of the PDUs (see hardware-based MAC component 24B, as shown in Fig. 6 which includes transmit logic 34 and transmit queues 36 and 38, where higher priority may be given to one of the queues (as taught in column 9, lines 17-20, where the “characteristics of the data packets” may be time-critical packets as described in column 2, lines 35-41, policies included in command structures from the software-based MAC component 24A (such as shown in Figs. 9-10) or the “prioritization scheme” taught in column 11, lines 1-3).

Regarding the features of claim 1, which recite:

wherein the packet information is based on a header or an identifier of a corresponding data packet, and characteristics of the data packets (see command structure 60 (included in packet headers) which includes characteristics of the packet);

a transmitter for arranging the PDUs given the second priorities in an allocated bandwidth to transmit the PDUs (see transmit logic 34 which arranges the PDUs in allocated bandwidth (to be transmitted by radio 30 as shown in Fig.2);

wherein the first module is constructed in a MAC layer by software and the second module is constructed in the MAC layer by hardware (see 24A and 24B);

wherein the first module further comprises the plurality of QoS queues for dividing and storing the data packets classified by the classifier, and a plurality of priority queues by dividing and storing the data packets admitted by the admission controller

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based on their priorities (see column 9, lines 32-35, of Edwards, which teaches that the “software-based MAC component 24A also has a number of virtual queues to assist QoS functions” and regarding the recited “priority queue”, see transmit queues 36 and 38 (as shown in Figs. 6 and 8), which store packets based on priority, as recited);

wherein the classifier identifies the type of packet traffic and stores a data packet of the packet traffic in one of the plurality of QoS queues based on the QoS policy corresponding to the identified type (see column 9, lines 32-35, which teach that the “software-based MAC component 24A also has a number of virtual queues to assist QoS functions”);

wherein the type of packet data traffic comprises at least one of audio data and burst data (see column 5, line 59, which teaches “voice” or audio data, as recited).

Regarding the recited features related to the “admission controller”, such as “an admission controller for determining admission or discarding of the classified data packets provided from a plurality of QoS queues based on a current call state and characteristics of the classified data packets”, and the additional references to the admission controller, although any packet which is stored in the queues after being classified must have had its’ “admission determined”, Edwards does not explicitly teach “an admission controller”. Additionally, it is noted that although Edwards teaches generating “packets” (which could be considered as a “protocol data unit” or PDU), Edwards does not explicitly teach a “PDU maker for generating PDUs from the data packets given the first priorities”.

The MAC protocol article (which is for an “OFDMA-TDMA (Orthogonal Frequency Division Multiplex--Time Division Multiple Access) based wireless Internet terminal”, as recited) teaches methods of scheduling packets for transmission. As shown in Fig. 3 of the MAC protocol article, packet traffic related functions include “classifying” the packets into “guaranteed bandwidth” or “best effort” queues and providing the packets from these queues to a MAC scheduler which uses a MAC fair scheduling algorithm. As described in sections B and C on page 1612 of the MAC protocol article (and shown in Fig. 6 on page 1613), the MAC signaling section and MAC fair scheduling algorithm sections teach the use of MAC PDUs for scheduling and transmission purposes, which for scheduling purposes based on available bandwidth results in accepting/dropping of classified packets (recited “admission controller determines admission or discarding based on current call state and characteristics and based on a degree of importance lower than a predetermined degree based on a network state”). Additionally, see section B (on page 1616) of the MAC protocol article “Admission Control”, which details “rules for GB flows”, which relate to “admission or discard of packets”. The MAC scheduler also “generates PDUs from the packets given priorities”, as recited. Additional details of “admission control” are found in the last paragraph on page 1609, the first paragraph on page 1612 and the “admission control” section B, which begins on page 1616.

Therefore, as both Edwards and the MAC protocol article teach packet QoS features implemented in the MAC layer, it would have been obvious to one of ordinary skill in the art to modify the software module of Edwards to include the admission

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controller functions (as taught by the MAC protocol article), in order to properly schedule packets for transmission (after first determining if they should be included in scheduling, based on bandwidth or time requirements, etc.), as is conventional.

Regarding the amendment to claim 1 (which incorporated the language previously recited in claim 5), which now recites “a sorting queue for storing PDUs based on the second priorities of the PDUs assigned by the second priority controller”, as described above, transmit queues 36 and 38 (which are the “sorting queues”, as shown in Figs. 6 and 8), store packets based on priorities which may be determined and assigned by the transmit logic 34 (recited “second priority controller”, where these assigned priorities are based on the information included in command structure 60), where higher priorities may be given to one of the queues (as taught in column 9, lines 8-25), which therefore “store based on the priority”. See also column 2, lines 35-41, which teaches that the “characteristics of the data packets” may be time-critical packets and see column 11, lines 1-3, which teaches that “transmit logic controls transmission of packets from queues 36 and 38, possibly implementing a prioritization scheme”.

Regarding independent method claim 8 (which recites the same features performed by the structures recited in claim 1), see the rejection of claim 1 above.

Regarding claim 2, which recites “wherein the QoS policy maximizes a bandwidth utilization rate and minimizes a packet loss rate in a current communication environment”, the QoS policies (and packet processing performed) in Edwards and the

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MAC protocol article would broadly “maximize a bandwidth utilization rate and minimize a packet loss rate in a current communication environment”, as recited.

Regarding claim 6, which recites “wherein the PDUs are MAC PDUs, and the second priority controller determines which one among an ACK packet, a management message packet, and a user data packet, a corresponding packet is, based on headers or identifiers of the MAC PDUs and gives the second priorities to the MAC PDUS in the order of an ACK packet, a management message packet and a user data packet independently from the QoS profile”, see column 9, lines 20-23, which teach that (recited “determined”) packets from “queues 36 and 38 can be used to separate packets that should be transmitted in an announcement traffic indication message (ATIM) period from those that should not”, which is a “management message packet”, as recited. See also column 16, lines 16-24 which teaches that “MAC H/W component 24B is used to find time to transmit ACK packets”. Therefore, as Edwards also teaches that the second prioritizing of packets (from queues 36 and 38) can also be based on other factors such as time-sensitive packets and ACK packets (and may be performed “on the fly” (column 12, line 21)), it would have been obvious to one of ordinary skill in the art to prioritize the packets (or MAC PDUs as modified by the MAC protocol article) in the recited order, as time sensitive packets should be prioritized over user data packets, as is conventional.

Regarding claim 7, which recites “wherein the first priority controller gives data, which requires real-time transmission, a higher priority than data, which tolerates transmission delay, based on the QoS policy”, see QoS module 58 in MAC SW

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component 24B, which would (inherently and/or obviously) give higher priorities to real-time data (such as voice data), as is conventional.

Regarding claim 9, which recites “wherein arranging the data packets sequentially sorts the data packets based on the second priorities and arranges the sorted data packets in an allocated bandwidth,” as described above in the rejection of claim 6, as Edwards also teaches that the second prioritizing of packets (from queues 36 and 38) can also be based on other factors such as time-sensitive packets and ACK packets (and may be performed “on the fly” (column 12, line 21)), it would have been obvious to one of ordinary skill in the art to “arrange” or prioritize the packets based on second priorities as recited, as is conventional.

Regarding claim 10, which recites “wherein providing second priorities determines which one among an ACK packet, a management message packet, and a user data packet, a corresponding packet is, based on headers or identifiers of the MAC PDUs and gives the second priorities to the MAC PDUs in the order of an ACK packet, a management message packet and a user data packet independently from the QoS profile”, see column 9, lines 20-23, which teach that (recited “determined”) packets from “queues 36 and 38 can be used to separate packets that should be transmitted in an announcement traffic indication message (ATIM) period from those that should not”, which is a “management message packet”, as recited. See also column 16, lines 16-24 which teaches that “MAC H/W component 24B is used to find time to transmit ACK packets”. Therefore, as Edwards also teaches that the second prioritizing of packets (from queues 36 and 38) can also be based on other factors such as time-sensitive

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packets and ACK packets (and may be performed “on the fly” (column 12, line 21)), it would have been obvious to one of ordinary skill in the art to prioritize the packets (or MAC PDUs as modified by the MAC protocol article) in the recited order, as time sensitive packets should be prioritized over user data packets, as is conventional.

Regarding claim 15, which recites “wherein the QoS policy maximizes a bandwidth utilization rate and minimizes a packet loss rate in a current communication environment and wherein providing the first priorities to the classified data packets gives data, which requires real-time transmission, a higher priority than data, which tolerates transmission delay, based on the QoS policy”, see the rejection of claims 2 and 7 above.

3. Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards and the MAC protocol article as applied to claims 1 and 8 above, and further in view of U.S. Patent Pub. 2004/0160960 to Monta et al. (hereinafter “Monta”).

Regarding claims 5 and 9, which now recite “wherein a PDU having a highest priority is located at the bottom of the sorting queue”, the description of the transmit queues 36 and 38 in Edwards does not explicitly teach storing the PDUs, as recited.

In an analogous art, Monta teaches a system which provides classified packets from a number of buffers to a packet scheduler. See for example, Fig. 3 which teaches a packet classifier 302, multiple FIFO memories 304, a packet scheduler 306 and a Priority Queue 308. As described in sections [0043] to [0045], a packet is given an

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initial priority (by classifier 302) and then is placed into one of the FIFO memories 304. Packet scheduler 306 then checks the priority of the packets from each FIFO 304 and orders them (based on priority) into the Priority Queue 308. See for example, section [0043] which teaches “The Packet Scheduler 306 determines where this new entry should be inserted into the Priority Queue 308 by comparing the priority associated with the new entry with the priorities of the existing entries in the queue. Since the Priority Queue 308 is always sorted according to priority, this process simply involves locating the pair of consecutive entries having priorities that are respectively less than and greater than (or equal to) the priority of the new entry, and inserting the new entry in between this pair.” Regarding the claim language of “storing the PDU with the highest priority at the bottom”, this language is interpreted to mean that the highest priority packet (or PDU) is output first, which is how the Priority Queue 308 of Monta stores the packets.

Therefore, as both Monta and Edwards teach reordering packets after a first classification/prioritization, it would have been obvious to one of ordinary skill in the art to modify Edwards to store the PDUs in order (as recited and as taught by Monta), in order to output the most critical packets first, as is conventional and as would be desired.

Response to Arguments

4. Applicant's arguments filed 01-04-11 have been fully considered but they are not persuasive. Regarding Applicant's remarks on page 7 that Edwards does not teach that the second module (hardware based MAC component 24B) assigns the "second priorities". It is noted that the recited second priorities are "based on header or an identifier of the corresponding packet" and the claims do not explicitly recite that the second priorities are different than the first. Therefore, when the hardware based MAC component 24B receives packets (which include the "priorities" in the command structure 60) from the first module (software based MAC component 24A), the transmit logic 34 (in the hardware based MAC component) may "determine" these priorities as included in the command structure 60, and then "assigns" this same determined priority (which is "based on the header or an identifier of the corresponding packet"), as recited. These prioritized packets are then stored in queues 36 and 38 with a "prioritization scheme" as described in column 11, lines 1-4. In addition to processing packets for the first time, hardware based MAC component 24B may also perform "reprocessing" of packets (such as for packet retransmissions), which would also involve "assigning" priorities of these retransmitted packets within streams of packets being pulled from queues 36 and 38. For example, transmit logic may determine to finish transmitting packets of a lower QoS before performing retransmission of packets with a higher QoS. See also column 16, lines 24-30, which teach that hardware based MAC component 24B may recognize beacon packets (from MAC information), which would be "time sensitive packets" (as described in column 2, line 40), which would require "assigned"

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priorities of transmission from queues 36 and 38. Therefore, Applicant's arguments are not persuasive.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN KELLEY whose telephone number is (571) 272-5652. The examiner can normally be reached on Monday-Friday, 9AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid can be reached on (571) 272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SSK/

/LESTER KINCAID/

Supervisory Patent Examiner, Art Unit 2617